

In the Specification

Kindly replace paragraph [0027] with the following:

[0027] That is to say, it concerns a fiber bundle traversing device comprising a traverse guide for guiding the fiber bundle and a traverse mechanism of the traverse guide, and traversing the fiber bundle by reciprocating said traverse guide in the direction of the bobbin rotation ~~direction~~ rotating shaft by means of the traverse mechanism, wherein said traverse guide has a yarn guide mechanism for guiding the fiber bundle performing such an operation that the traverse guide deviates from the yarn path in the original yarn path direction.

Kindly replace paragraph [0030] with the following:

[0030] That is to say, it concerns a fiber bundle traversing device comprising a traverse guide for guiding the fiber bundle and a traverse mechanism of the traverse guide, and traversing the fiber bundle by reciprocating said traverse guide in the direction of the bobbin rotation ~~direction~~ rotating shaft by means of the traverse mechanism, wherein said traverse guide comprises, at least, an upper guide roll of which a roll rotating shaft is arranged at a position twisted substantially at a right angle to said bobbin rotating shaft and a final guide roll of which the roll rotating shaft of is arranged substantially parallel to said bobbin rotating shaft, wherein these upper guide roll and final guide roll are arranged respectively such that the rotating shaft direction of the guide roll and the direction of the yarn path entering the guide roll cross substantially at a right angle.

Kindly replace paragraph [0042] with the following:

[0042] Fig. 1 is a schematic model perspective view showing in a model-like manner the overall structure of yarn path guide 1 according to the present invention. The yarn path guide 1 according to the present invention guides traveling yarn (fiber bundle) Y and comprises a guide roll [[1]] 2 and a supporting member 3 that supports the guide roll. The supporting member 3 has a rotating shaft 4 at a position twisted at a right angle in the rotating shaft direction of the guide roll 2 and is constituted so that the yarn (fiber bundle) can be guided automatically in the central direction of the original yarn path (yarn path set based on the position of supporting the traveling yarn on the upstream and downstream side. In terms of the device constitution, the set yarn path. It does not need to be straight and may have the region or the range.) by inclining the guide roll 2 with respect to the yarn path through rotation around the rotating shaft 4 of the supporting member, in response to variation of the yarn path (actual path of the traveling yarn).

Kindly replace paragraph [0060] with the following:

[0060] Moreover, as shown in Fig. 7(a), it is preferable that the rotating shaft of the guide roll and the yarn path entering the guide roll are arranged at a position twisted substantially at a right angle. In case where the rotating shaft of the guide roll and the yarn path entering the guide roll are not arranged at a position twisted at ~~a right~~ a right angle as shown in Fig. 7(b), the fiber bundle slips on the roll, deteriorating in the yarn quality.

Kindly replace paragraph [0066] with the following:

[0066] In general, in case of using a guide roll for conveying and guiding fiber bundle, the fiber bundle takes such a yarn path where the path length thereof becomes the shortest. Therefore, if the fiber bundle does not ~~skip~~ slip on the guide roll, the fiber bundle enters at a right angle to the rotating shaft of the guide roll.

Kindly replace paragraphs [0070] through [0074] with the following:

[0070] Tape-like or wide width fiber bundle passes through the yarn path guide and is its tape surface or wide width surface is held and restricted by the upper guide roll 14 positioned on the most upstream side of the traverse guide 6. Next, the fiber bundle is twined by 45° between the upper guide roll 14 and the ~~central~~ intermediate guide roll 15, twined further by 45° between the ~~central~~ intermediate guide roll 15 and the final guide roll 16, finally the tape surface or wide width surface thereof are arranged parallel to the bobbin rotating shaft, surface pressure is imparted by a pressure roll 13 and wound by a bobbin. Here, the yarn path deviation not shown on the upstream side causes deviation of the yarn path on the yarn path guide 12. This deviation of the yarn path on the yarn path guide 12 deviates also the yarn path entering the upper guide roll 14 (Fig. 5 (a)). However, this deviation of the yarn path causes the yarn bending and, as a result, turns up to incline (Fig. 5 (b)) the upper guide roll 14 in the direction to release the yarn bending (clockwise direction in the drawing).

[0071] Thus, by the inclination of the guide roll 2 the ~~yarn~~ fiber bundle is guided in the direction twisted at a right angle to the guide roll, namely in the original yarn path direction (Fig. 5 (c)). Moreover, this operation is executed automatically by the tension of the ~~yarn~~ fiber bundle itself, permitting to control variation of the yarn path effectively.

[0072] Next, the fiber bundle passes through the ~~central~~ intermediate guide roll ~~14~~ 15 and arrives at the final guide roll ~~15~~ 16. As shown in Fig. 7, the fiber bundle on the final guide roll ~~15~~ 16 is pulled

by the tension alternatively to the direction opposite to the movement direction of the traverse guide, according to the reciprocation of the traverse guide. As a result, if the fiber bundle is not held sufficiently by the guide roll, the fiber bundle skips on the guide roll as shown in Fig. 7(b) and the angle between the roll rotating shaft of the guide roll and the yarn path entering the guide roll can not be kept right angle. However, by making the length of the guide roll in contact with the fiber bundle sufficiently long, more particularly, 15 mm or more, the yarn skipping can be controlled effectively by the friction between the guide roll and the fiber bundle and a position relation where the roll rotating shaft of the guide roll and the yarn path entering the guide roll are twisted at a right angle can be kept. From the view point of stabilization of the yarn path, the contact length is preferably as long as possible; however it is preferably 50 mm or less, if considering the large-scale of the device.

[0073] As well as the final guide roll ~~15~~ 16, another guide roll where the roll rotating shaft is arranged substantially parallel to the rotating shaft of the winding bobbin, is added to be a set of two guide rolls, stabilizing the yarn path and therefore it is preferable. Moreover, it is preferable that the total length of these guide rolls in contact with the fiber bundle is 25 mm or more. However, considering the large-scale of the device, the number of guide rolls where the roll rotating shaft is arranged substantially parallel to the rotating shaft of the winding bobbin is preferably 3 or less and, the length of these guide rolls in contact with the fiber bundle is preferably 75 mm or less.

[0074] After all, in the fiber bundle traversing device, comprising a traverse guide for guiding the fiber bundle and a traverse mechanism of the traverse guide, for traversing the fiber bundle by reciprocating the traverse guide in the direction of the bobbin rotation-direction rotating shaft by means of the traverse mechanism, it is essential that said traverse guide has, at least two guide rolls, namely the upper guide roller arranged at a position where the rotating shaft thereof twisted substantially at a right angle to the rotating shaft of said bobbin and the final guide roll where the roll rotating shaft is arranged substantially parallel to said bobbin rotating shaft, wherein at least the upper guide roll and the final guide roll are arranged respectively so that the roll rotating shaft direction of the guide roll and the yarn path direction entering the guide roll have a positional relation twisted substantially at a right angle.

Kindly replace paragraph [0083] with the following:

[0083] When the carbon fiber is conveyed and guided, variation of the yarn path on the upstream guide roll 10 was ~~100~~ 10 mm, while variation of the yarn path on the downstream guide roll 11 was 2 mm.

Kindly replace paragraphs [0093]-[0097] with the following:

[0093] In the fiber bundle winding device as shown in Fig. 3 and Fig. 6, a tape-like carbon fiber bundle (the number of single fibers is 12000, the diameter of single fiber is 7 μ m, the width of fiber bundle is 6 mm, the ratio of the width of fiber bundle to the thickness of fiber bundle is about 60, elastic modulus of the strand is 230 GPa) having polyacrylonitrile-based fiber as precursor fiber was wound around a bobbin (paper tube) of 80 mm in outer diameter at winding speed of 10 m/min and traverse width of 250 mm. Here, as for all of guide rolls of the traverse guide 6, free rotating rolls of 22 mm in outer diameter and 40 mm in length. Besides, the length L of the final guide roll ~~45~~ 16 in contact with the fiber bundle was set to 15 mm.

[0094] When the fiber bundle was wound by this winding device, variation of the yarn path on the final guide roll ~~45~~ 16, due to reciprocation of the traverse guide was 1 mm or less. Besides, the quantity of fluff wrapped around the final guide roll ~~45~~ 16 after 50 hours of winding operation was 0.8 mg.

Comparative example 5

[0095] Except that the length of the final guide roll ~~45~~ 16 in contact with the fiber bundle was set to 10 mm, the fiber bundle winding device similar to the Example 3 was used to wind carbon fiber bundle.

[0096] As a result, variation of the yarn path on the final guide roll ~~45~~ 16, due to reciprocation of the traverse guide was 5 mm. Besides, the quantity of fluff wrapped around the final guide roll ~~45~~ 16, after 50 hours of winding operation was 2.5 mg.

Example 4

[0097] The upper guide roll 14 was arranged so that the rotating shaft 4 of the supporting member can be on the upstream side by 7 mm with respect to the rotating shaft 9 of the guide roll, and the final guide roll ~~45~~ 16 and the guide roll parallel to the final guide roll was provided as lower guide roll, and they were arranged so that the total length of these guide rolls in contact with the fiber bundle can be 25 mm. In addition, an intermediate guide roll was arranged between the upper guide roll and the lower guide roll. The intermediate guide roll was inclined in response to the yarn path, so that the rotating shaft of the guide roll can be perpendicular to the yarn path entering the guide roll, because the yarn path becomes slant, if the intermediate guide roll is pressed against the fiber bundle.